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Innovation:
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**Standardization and technological innovation:
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I. Introduction

In today's technology-driven world, industry standardization, component interoperability, and product-compatibility have become critical to promoting innovation and competition. Standards are typically created by voluntary organizations (generally referred to as standard-setting organizations (SSOs)) composed of participants from a given market or industry (electronic components, communications, etc.). They meet to discuss, analyze, refine, and ultimately adopt mutually acceptable standards, which ensure competing and complementary products and components are compatible and can interoperate with one another. SSOs have thus gained importance over the years in technology-driven sectors.

There is a wide variety of SSOs engaged in standardization efforts in an increasingly large number of industries.¹ The European Telecommunications Standards Institute (ETSI),² for instance, develops standards ensuring the compatibility and interoperability of products in the information and communications technology (ICT) sector. Technology developers, handset and network manufacturers, and mobile carriers regularly meet within ETSI and other SSOs to pursue standardization work. It is within ETSI that the GSM (2G) standard was developed. The 3rd Generation Partnership Project (3GPP) project,³ which specifies standards for third generation technology (3G) mobile phone systems, developed as a co-operative venture between ETSI and other relevant SSOs.

The policies and procedures of SSOs ensure that standards are developed in an open environment. Each participating member has the opportunity to contribute to the scope of the standard, participate in its development, take part in the "consensus-driven" approval process of each standard, and make its positions known including through appeals. These policies and

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¹ See generally Mark A. Lemley, "Intellectual Property Rights and Standard-Setting Organizations", (2002) 90 *California Law Review* 1889.

² ETSI, headquartered in Sophia Antipolis, France, was formed in 1988 by the CEPT and is officially recognized by the European Commission as the organization responsible for standardization of information and communication technologies within Europe. Its mission is to "*develop globally applicable deliverables meeting the needs of the Information and Communications Technologies ("ICT") community.*"

³ 3GPP is a collaboration agreement that was established in December 1998. It's a co-operation between ETSI (Europe), ARIB/TTC (Japan), CCSA (China), ATIS (North America) and TTA (South Korea). The scope of 3GPP is to make a globally applicable third generation (3G) mobile phone system specification within the scope of the ITU's IMT-2000 project. Note that 3GPP should not be confused with 3GPP2

procedures allow for the most appropriate technology to become standardized, based upon technical merit and other relevant factors and ensure that no single participant can manipulate or abuse the standards process. While firms compete for having their technologies included in a standard, checks and balances are built within the SSOs' decision making procedures to ensure that the best technological option succeeds. Companies therefore are willing to contribute to the work undertaken by SSOs, which in turn allows for the wide diffusion of cutting-edge technologies to the benefit of society.

While SSOs, such as ETSI, have significantly contributed to the development of, and the growing competition within, the ICT sector, there are concerns that their activities could produce anti-competitive effects. Under traditional standard development procedures, intellectual property rights (IPRs) owners disclose the patents that they consider are essential for a standard. At the same time, they typically provide an assurance or commitment that, if their patents are included in a standard, they will license their IPRs on fair, reasonable and non-discriminatory (FRAND) terms, with or without monetary compensation. Some commentators believe that these licensing commitments (i.e. FRAND) are insufficient.⁴ First, they claim that implementers of standards are unable to obtain sufficient information *inter alia* on the cost of implementing the standard. Implementers therefore cannot take an informed decision about whether to include the proposed technology in the standard. Second, it is also argued that implementers may be forced to pay higher royalties, because patent owners will "hold up" or "ambush" the standards users (licensees) by asserting patents only after these users are locked into the standardized technology. Finally, it is said that the cumulative royalty rate paid by users when the standard involves multiple essential patents may be too high, because patent holders do not fully take into account the impact of an increase in their royalties on the cumulative royalty rate. None of them wants to bear the cost of maintaining the aggregate royalty rate paid by users at a moderate level (this is known in the patent literature as the "tragedy of the anti-commons").⁵

To prevent these alleged problems from occurring, firms and commentators have proposed a number of remedies, such as, for instance, an obligation for all firms holding essential patents not only to disclose them at an early stage, but also to announce their licensing terms before the standard is formally adopted by the SSO (this is generally referred to as the "ex ante" licensing approach).⁶ Others have gone one step further and suggested the need to allow joint negotiations of licensing terms by essential patent holders and standard implementers before a given standard is formally adopted.⁷ At the ETSI level, some members have suggested redefining FRAND so that it includes the concepts of "aggregated reasonable returns" and "proportionality".

⁴ See, e.g., Gil Ohana, Marc Hansen, and Omar Shah, "Disclosure and Negotiation of Licensing Terms Prior to Adoption of Industry Standards : Preventing Another Patent Ambush", (2003) 24 *European Competition Law Review*, 644.

⁵ See, e.g., Carl Shapiro, "Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting", in Adam Jaffe, Josh Lerner and Scott Stern (eds.), *Innovation Policy and the Economy*, vol 1, MIT Press, 2001.

⁶ See, e.g., Disclosure of Licensing Terms During Standard Setting: The Need for Antitrust Agency Guidance, submitted by Apple Computer, Cisco Systems, Hewlett-Packard Company, International Business Machines, and Sun Microsystems to the Antitrust Division of the United States Department of Justice and the Federal Trade Commission, June 2005.

⁷ See Ohana et al., *supra* note 4.

Although these proposals may appear superficially attractive, they do not rely on any empirical evidence that standardization procedures lead to excessive royalty rates, which negatively affect the take up of products based on such standards. The absence of such evidence fails to convince that a reform is needed, especially considering that current SSO standardization procedures have successfully promoted compatibility between products with resulting positive consequences on the diffusion of technologies and the degree of competition between products on the marketplace.⁸

In addition, these proposals ignore the traditional welfare trade off between stimulating the diffusion of new technologies and promoting innovation in the first place.⁹ Any limitation on the royalties that can be charged by innovators comes at a cost: by limiting the returns to innovators, such limitations discourage investment and stifles the innovation process. Such an outcome would go counter to of the central objectives of the Lisbon agenda, which is to turn the EU into “the most competitive and dynamic knowledge-based economy in the world”.

These proposals are based on an inadequate understanding of the economics of standardization and patent licensing, and rely on incorrect assumptions. As will be seen below, they ignore the various constraints faced by firms holding essential patents when setting royalty rates, namely: (a) horizontal constraints from the royalty rates set by the holders of complementary patents, (b) vertical constraints due to the impact of an increased royalty rate on downstream activity, and (c) institutional constraints associated with the standardization process which tends to penalise in subsequent iterations of the selection process those patent holders who behaved opportunistically in the past. These proposals also tend to overestimate the benefits of the proposed reforms and underestimate their costs. Finally, proponents of such reforms fail to appreciate that their proposals could lead to anti-competitive outcomes prohibited by competition rules.

This paper is organized as follows. Following this introduction, Section II explains the current system applied in most SSOs, whereby firms holding patents that they deem essential to a standard considered by an SSO commit to license these patents on FRAND terms. Section III outlines the proposals that have been made in a variety of fora to replace the current system with a more demanding regime of mandatory disclosure of licensing terms before a standard is adopted or even a system of joint negotiations by essential patent holders and standard implementers of such terms. This section outlines the fact that these proposals are based on an incorrect perception of the so-called hold-up problem and examines the various shortcomings of the proposals designed to remedy this perceived problem. Section IV analyzes the proposals made by some members of ETSI that its current IPR policy be revised in order to introduce the principles of “aggregated reasonable terms” and “proportionality” into the definition of FRAND. Section V shows that any regime based on the imposition of royalty caps and the allocation of the determined level of royalty on the basis of proportionality is inherently flawed. Finally, Section VI contains a brief conclusion.

⁸ See Richard S. Taffer, “Ex Ante Licensing in Standards Development: Myths and Reality”, AIPLA Spring Meeting, Chicago, Illinois, 4 May 2006, p. 2 (“The dearth of real “hold up” or “royalty stacking” problems may be because the balance of interests that is accommodated by the existing standards development processes, the existing procedures followed by standards developers that actually accommodate the “ex ante” disclosure of IPR, the bilateral (rather than collective) negotiation of license terms, and the inherent nature of the marketplace militate against “hold up” or “royalty stacking” without the imposition of mandatory rules and the required collective determination of license terms.”)

⁹ See, e.g., Suzanne Scotchmer, *Innovation and Incentives*, MIT Press, 2004.

II. FRAND commitments by holders of essential patents

Standards typically include technologies protected by intellectual property rights. An intellectual property right entails an exclusive right, allowing its owner to prevent any third party from applying or using what is protected by this right.¹⁰ Except in certain very exceptional circumstances, a patent owner may therefore decide not to grant any third party a licence to practice the invention. These exclusive rights are recognized in all patent laws as well as in the TRIPS agreement.¹¹

SSOs cannot force a patent owner to grant a licence. Patented technology that becomes part of a standard can only be used by third parties if the patent owner is willing to grant a licence. The ETSI IPR policy does not contain any obligation to license essential IPR. Rather, it provides that a standard or specification may not be approved unless the owner of essential IPR provides an assurance of its licensing intentions. For example, Section 6.1 of ETSI's IPR Policy provides that when essential IPR is disclosed, ETSI will request – but not oblige – the owner of the IPR to undertake in writing that it is prepared to grant irrevocable licences on FRAND terms and conditions, and as such to waive its right to refuse to license.

Likewise, if the owner of an essential IPR decides not to subscribe to a FRAND commitment, it does not necessarily follow that the relevant IPR will be excluded from the standard. Under Article 8.1 of ETSI's IPR Policy ETSI's General Assembly will examine whether alternate technical solutions exist. Where it concludes that this is not the case, the Director General may request the owner of the IPR to reconsider. However, the latter is not under an obligation to agree to license.

The question as to what “reasonable terms” are goes back to the second prerogative of the patent owner, i.e. its right to be rewarded for the innovative contribution made and to ask the price that the market is willing to pay.¹² Again, a standardization process does not deprive a patent owner from this prerogative. The only material consequence of making a FRAND commitment is that the patent holder waives its right to refuse to engage in good faith negotiations to license. The specific terms of any licence, however, are left to the parties to the negotiation.

Licensing negotiations are conducted outside SSOs. For example, ETSI makes clear that such discussions will not take place under its standard development activities, as it takes the view that its role is directed to technical rather than commercial issues. The “reasonable”

¹⁰ See Gerald F. Massoudi, Deputy Assistant Attorney General, Antitrust Division, U.S. Department of Justice, “Intellectual Property and Competition: Four Principles for Encouraging Innovation”, Digital Americas 2006 Meeting, Intellectual Property and Innovation in the Digital World, Sao Paulo, Brazil, 11 April 2006, p. 3 (“In the world of physical property, enforceability means the right to exclude: for example, the ability to evict a person from your land. In the world of intellectual property, the fundamental right is similar: an enforceable IP right means the right to exclude others from using your intellectual property right at all.”)

¹¹ Article 28 TRIPS agreement.

¹² See Massoudi, *supra* note 10, p. 7 (“Licensing freedom also means the right to charge whatever royalty the IP owner wishes. Competition law enforcers, who are the usual recipients of complaints about “excessive” royalties, are not in the business of price control. We protect a competitive process, not a particular result, and particularly not a specific price. In fact, if a monopoly is lawfully obtained, whether derived from IP rights or otherwise, we do not even object to setting a monopoly price.”)

and “non-discriminatory” character of any licence must be addressed in a commercial context outside the standards-setting environment. ETSI’s Guide on IPRs confirms this:

“Specific licensing terms and negotiations are commercial issues between the companies and shall not be addressed within ETSI. Technical Bodies are not the appropriate place to discuss IPR issues. Technical Bodies do not have the competence to deal with commercial issues. Members attending ETSI Technical Bodies are often technical experts who do not have legal or business responsibilities with regard to licensing issues. Discussion on licensing issues among competitors in a standards making process can significantly complicate, delay or derail this process.”¹³

The main purpose behind FRAND is thus to ensure that any standard adopted remains available for implementation by all companies willing to take advantage of the opportunity to negotiate and enter into a licence agreement. FRAND therefore aims at preventing an outright refusal to license.¹⁴ FRAND commitments do not impose any form of price control on the licensor, nor an obligation to license on disadvantageous conditions. On the contrary, FRAND means that royalty rates should be determined through fair, bilateral negotiations in accordance with market conditions.

Licensing freedom is of critical importance as it: (i) gives firms incentives to contribute IP to standards and make innovative technologies more broadly available; (ii) provides each licensee with the most advantageous license terms based upon its relationship with the licensor (cross licenses, pass through, etc.); and (iii) accommodates the dynamic nature of standards development because it recognizes that licenses negotiated at different times reflect different values that may make terms “reasonable” at a particular moment in time.

III. Proposed transition to a system of ex-ante disclosure of licensing terms

While the system of FRAND commitments has largely achieved its purpose of making technologies included in standards available on reasonable conditions, some firms and commentators argue SSOs should opt for a more demanding system of ex-ante licensing. Proposals have been made in a variety of settings encouraging SSOs to mandate essential patent holders to disclose their licensing terms before a standard is formally adopted. Some proposals have gone one step further suggesting the need for ex ante negotiations of royalty terms between licensors and licensees.

The following section first shows that these proposals exaggerate and misunderstand the hold-up problem. They then demonstrate that, while the ex ante proposals appear superficially attractive, they suffer from serious shortcomings. At best, they could amount to an unjustified transfer of wealth from innovators to implementers. At worst, they could seriously undermine innovation.

¹³ ETSI Guide on IPRs (version 23 November 2005), Section 4.1.

¹⁴ Such as was the situation in the *Magill/IMS* cases. See Joined Cases C-241/91 P and C-242/91 P, *RTE and ITT v Commission (Magill)* [1995] ECR I-743; and Case C-418/01, *IMS Health v NDC Health* [2004] ECR I-05039.

A misleading perception of the "hold up" problem

Although they do not say expressly so, proposals for mandatory ex ante disclosure of licensing terms seem partly based on the idea that some firms are able to manipulate SSOs by misleading their members into adopting standards comprising their technologies and then, once the standards have been adopted, charging excessive rates to locked-in manufacturers wishing to implement these standards. This view is, however, over-simplistic. As noted above, SSOs, and in particular ETSI, operate in an open and multi-layered environment where every member can have its views taken into account and benefit from various appeal procedures in case it is opposed to the adoption of a given standard. The idea that, other than in very rare and exceptional circumstances, one firm is able to manipulate an SSO to have its technology included in a standard to subsequently charge unreasonable royalties to implementers of that standard thus lacks credibility.

Of particular concern to some ex ante proponents is the situation of firms which hold essential patents, but which are not engaged in downstream manufacturing activities. It is suggested that unlike firms engaged in upstream technological innovation and downstream manufacturing activities (i.e., vertically-integrated firms), firms only active upstream would not be constrained by the fear that high royalty rates could negatively affect the sales of products implementing the standard in question. There are, however, no reasons to believe upstream-only firms have the freedom to impose excessively high royalty rates. These firms are indeed subject to horizontal, vertical and institutional constraints. We will analyze each in turn.

Horizontal constraints. In most circumstances, firms hold complementary patents that comprise a given standard and customers must license the essential patents from all these companies to practice that standard. For instance, if firms A, B, C, D, and E hold essential patents for standard X, standard implementers will need to obtain licenses from these five firms. Since these essential patents will typically cover different aspects of the standards, they are complements, not substitutes. This means that, in our example, if firms B, C, D, and E charge high royalty rates, firm A will not be able unilaterally to set a high royalty rate for its intellectual property.

In other words, when individually setting their own prices, owners of complementary intellectual property will take into account prices set by others, i.e. royalty rates, because the market will only bear a certain level of royalties. Holders of complementary patents are therefore price-constrained by other holders of essential patents at the horizontal level. This relationship between the royalties charged by other IP holders and the royalties that can profitably be charged by the company in question means that such company does not have pricing independence.

Firms holding essential patents are constrained by the royalty rates charged by the holders of essential patents that are strictly complementary, and thus cannot be regarded as dominant. There is a fundamental conflict of interest among the holders of complementary essential patents: each has an incentive to shift the industry from an equilibrium where its royalty rate is relatively low to another equilibrium where its royalty rate is high even when that may lead to a less efficient outcome in the aggregate. This result should make us aware of any attempt to reform the status quo as it suggests that it may just reflect a rent-seeking purpose.

Vertical constraints. Upstream-only firms' behaviour is also subject to competitive downstream constraints when, as it is often the case, their revenues are entirely or in part dependent on the volume of sales of the products implementing the standards. In such cases, these firms cannot exercise monopoly power by charging high royalty rates without damaging sales of these products, thereby lowering their revenues. For instance, a firm holding essential patents necessary to implement the 3G UMTS standard, but which does not manufacture 3G handsets, will nevertheless have an incentive in seeing the 3G sales increase as larger sales will translate in higher royalty revenues. Imposing unnecessarily high royalties would thus be a losing strategy for upstream-only firms as it would kill their source of revenues.

Vertically integrated firms are able to charge higher royalty rates than non-integrated firms. Whereas vertical integration eliminates the so-called vertical double marginalization problem, which should lead to lower royalty rates, there is an additional effect under vertical integration that tends to increase royalties. If a vertically integrated firm raises its royalty, it does not affect its own costs but it raises the costs of its competitors on the downstream market. By raising the costs of its downstream rivals the vertically integrated firm increases its downstream market share and its profits.

Institutional constraints. While it is the rare exception that a firm will be able to manipulate SSOs due to the open and multi-layered approach to standard setting they organize, there is nevertheless competition among intellectual property holders within SSOs to have their technology adopted in a standard. This competition takes place both before an SSO adopts a standard and after, to include new releases and next generation technologies.

If a company's technology is included in a standard, that company will face constraints in setting royalty rates for any associated patents because it will continue to depend on the SSO for its position as the standard evolves. Standards, particularly standards in mobile technology, are continually changing to incorporate improvements and repair deficiencies. The dynamic and evolving nature of standards gives participants in SSOs a number of opportunities to "punish" companies that have previously set what are considered to be excessive royalty rates. First, SSO members may be able to choose not to include a company's contributions in evolutions of the standard.¹⁵ Secondly, SSO members may be able to choose not to include a company's contributions in future generations of the standard (or in other unrelated standards). Thirdly, if companies gain a reputation for taking advantage of situations where their patents are implicated by a standard, SSOs may begin to insist that the firm commit itself ex-ante to the precise terms on which it will make its patents available, before including new patents in an upgrade or new generation.

Proposals for mandatory disclosure of licensing terms before a standard is formally adopted

As noted above, firms and commentators have made in a variety of settings proposals for a system of *mandatory* disclosure of licensing terms, whereby such terms, and in

¹⁵ See David J. Teece and Edward F. Sherry, "Standard Setting and Antitrust", (2003) 87 *Minnesota Law Review* 1913, 1941 ("[I]n many industries in which standards play an important role, the fast pace of technological change drives the continual redesign and reengineering of products. For example, the product life cycle in the semiconductor industry is reported to be as low as ten months. Therefore, even if there may be some "lock-in" of earlier designs, once the existence of the patent is disclosed, the SSO has the opportunity to revise the standards, and manufacturers have the opportunity to redesign their products to avoid incorporating the patented features. In other words, the extent of "lock-in" may be limited by the pace of technological change.")

particular royalty rates, should be disclosed by holders of essential patents before a standard is adopted as final.¹⁶

Proponents of this view seem to ignore that ex-ante disclosure of licensing terms is already largely applied by intellectual property holders.¹⁷ Nothing, for instance, in the ETSI IPR Policy and in the policies of many other SSOs, prevent essential patent holders from disclosing and negotiating license terms before a standard is adopted. In fact, patent owners have the incentive to engage in such ex-ante licensing conduct because it affords a greater likelihood that their patented technology will be included in the standard. As explained by the American National Standards Institute:

"A patent holder may have a strong incentive to provide an early assurance that the terms and conditions of the license will be reasonable and demonstrably free of unfair discrimination because of its inherent interest in avoiding any objection to the standardization of its proprietary technology."¹⁸

One advantage of voluntary disclosure is that it provides licensors and licensees with the ability to negotiate mutually advantageous terms specifically suited to the particular circumstances and their particular relationship. The danger with mandatory disclosure is that it leads to "one size fits all" solutions, which would not only homogenize licensing conditions, but also distort the way standards development now fosters competition between and amongst implementing standards participants. In the absence of mandatory disclosure of licensing terms, standard implementers may make different strategic choices. For instance, an implementer may decide to negotiate a license for patents - even before it is certain they become essential - as early negotiations may allow it to obtain better license terms than would be available after the standard is adopted. These advantageous license terms would then allow it to compete better against a late-to-license implementer, whose costs of implementation might be higher. Compulsory disclosures of licensing terms would eliminate that key competitive aspect of standardization processes.¹⁹

¹⁶ For a good illustration of such claims, see *Disclosure of Licensing Terms During Standard Setting: The Need for Antitrust Agency Guidance*, supra note 6.

¹⁷ As explained by Richard Holleman, a former IBM executive with extensive standards experience in the U.S. and internationally: "I believe there is a misperception of how potential license terms are discussed. First, more often than not, patent owners provide statements that if they have patents that are essential to implementation of the standard being developed they will license such patents on reasonable nondiscriminatory terms. Then, outside the activities of the SDO, individual standards participants are able to approach the patent holder to inquire of available licensing terms. The patent holder is also free to publicly state what its license terms will be. To the extent the patent holder does not make such a statement, or declines to engage in discussions with individual standards participants, it is always the discretion of the standards participant to not support the patent holder's technology or to propose an alternative technology to the standards developing committee. Ultimately, a consensus will establish what technology to support." Submission of Richard J. Holleman, *Comments on Standards Setting and Intellectual Property*, to the Joint Hearings of the United States Department of Justice and the Federal Trade Commission Regarding Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy, 10 April 2002, 2.

¹⁸ *ANSI Guidelines for Implementation of the ANSI Patent Policy* at 3-4.

¹⁹ See Taffet, supra note 8, at 9-10. See also Daniel G. Swanson and William J. Baumol, *Reasonable and Nondiscriminatory (RAND) Royalties, Standards Selection, And Control of Market Power*, 73 *Antitrust L.J.* 1, 15 (2005) ("[o]ne natural solution to the problem of ex post market power is for prospective licensees to negotiate contracts in advance of standard selection, when the market is at its most competitive and proponents of alternative technology are actively vying with each other for advantage").

Those who propose a system of mandatory disclosure fail to explain why it is necessary to render compulsory something that is often practiced on a voluntary basis to the overall satisfaction of licensees and licensors. Proponents of mandatory ex-ante disclosure point to the fact that such disclosure would offer a greater degree of certainty to potential licensees as to the costs of implementing the standard in question. Yet, as noted above, they fail to provide any empirical evidence showing that the current system has resulted in unfair licensing terms to standard implementers. Whilst calls for reforms should not be rejected per se, they should at least be based on credible evidence that there is something wrong with current standardization processes and FRAND commitments.

Proposals for joint negotiation of royalty rates including the imposing of maximum rates

Some firms and commentators want to go one step further and propose the need for a regime based on negotiations between and among potential licensors and licensees of royalty rates before a standard is formally adopted.²⁰ Besides the fact that this proposal raises similar defects as those outlined in the prior paragraphs, they introduce additional concerns, which will be discussed hereafter.

First, these proposals would represent a significant departure of most SSO policies, and in particular ETSI, whereby negotiations between potential licensors and licensees should take place outside standardization processes on a bilateral basis. The key objective of SSOs has been to base standards on optimal technological choices. By leaving licensing negotiations to take place outside the standards setting, SSOs also allowed standardization processes to proceed quickly and effectively without being impeded by complex and lengthy negotiations between essential patent holders and standards implementers. Allowing joint negotiations of licensing terms before a standard is adopted may introduce considerable delays, which could lead to the impossibility of adopting a standard or delay the adoption of such a standard for several months or years, thereby triggering significant welfare losses.

Second, these proposals, which generally focus on the negotiation of royalty rates, fail to recognize that royalty rates are just one element of the consideration that may be agreed between the parties to a licensing negotiation. In practice, there are many additional variables that need to be agreed and all of which are of appreciable value, such as cross-licensing, exhaustion of patent rights, upfront fees, jurisdiction, venue, assignability, scope of licence (e.g. products, territory, have made rights, etc.), audit requirements, payment terms and scheduling, currency choice, etc. The full commercial picture is thus more complex as there are important elements of consideration other than royalties. As a result, the ex ante negotiation of royalty rates would make unnecessarily rigid licensing negotiations between IP holders and licensees as they would place a cap on the monetary component of a licence while in many cases non-monetary terms will be equally or more important. This important point is made clearer in the example contained in the following paragraph.

Assume two companies (Company X and Company Y) have a patent position that is equal in value. Company X has a revenue of US\$40 billion selling handsets. Company Y has a revenue of US\$3 billion per year selling components. Both companies license their equally valuable patent portfolio to Company Z and neither of them charges Company Z a royalty. Instead Company X and Company Y receive a cross-licence under Company Z's patents.

²⁰ See, e.g., Ohana et al., *supra* note 4.

Since Company X has a substantially larger business which benefits from Company Z's cross-licence, it receives more value for its patent portfolio than Company Y. This example shows why one should not look only at the royalties that a company receives for licensing its patents - it is much more complicated than that. Alternatively, if company Y receives a royalty and a cross-licence, who is to say in that scenario which company has received more value for its patents. Company X will focus more importance on receiving the cross-licence to protect its US\$40 billion per year business. Company Y will focus less on its product supply business and more on royalties to obtain its return.

Third, proposals for joint negotiations of royalty rates before the adoption of a standard could trigger serious antitrust concerns. In the first place, such negotiations would involve collaboration between competing firms during rate negotiations. Such collaboration would fall under Article 81(1) as it would no doubt create some restrictions of competition. First, joint negotiations of royalty rates would lead to a homogenization of the licensing conditions granted to standard implementers and thus of the conditions of competition. As we have seen above, the current system of *voluntary* disclosure of licensing terms allows some degree of competition between standard implementers during the standardization process, which would disappear with a system of joint negotiations. Second, joint negotiations would produce a "one-size fits all" approach preventing efficient discrimination in royalty rates. Because standard implementers are not equally situated (as, for instance, some have wider patent portfolios than others), charging a similar level of royalties to all implementers would prevent the adoption of flexible deals taking into account their various situations. The imposition of similar royalties to differently situated implementers could even be considered as a form of illegal price discrimination. Third, joint negotiations would also be likely to create some serious anti-competitive exercise of oligopsony power. As in classic example of buyer power, the negotiations would be primarily aimed at depressing the royalties (i.e., the prices), which standard implementers would pay for gaining access to essential patents.²¹ This would in turn result in a reduction in the supply of innovation as it would diminish the licensors' incentives to innovate.

The issue would then be whether the proposed joint negotiations regime could be justified under Article 81(3) of the EC Treaty.²² Although this is not the place here to engage in a detailed analysis of the proposed approach under Article 81(3), it is seriously doubtful whether this approach could benefit from a positive Article 81(3) assessment. First, because its probable negative impact on the reward granted to licensors, and in particularly on non-

²¹ See OFT, "The Welfare Consequences of the Exercise of Buyer Power", Research Paper 16, September 1998.

²² In a December 2005 press-release (IP/05/1565, 12 December 2005, "Commission welcomes changes in ETSI IPR rules to prevent 'patent ambush'"), the Commission took note of the fact that ETSI's General Assembly had established a group with the mission to examine possible changes to ETSI's standard-setting rules, in particular on the issue of *ex ante* licensing. It stated that it had "indicated in its Guidelines on the application of Article 81 of the EC Treaty to technology transfer agreements (see IP/04/470) that such *ex ante* licensing can have pro-competitive benefits when subject to appropriate safeguards" and that it would follow ETSI's forthcoming discussions with interest. This statement from the Commission cannot be interpreted as meaning that it is *prima facie* favourable to the joint negotiations approach or to any of the other reforms proposed by firms and commentators in the framework of this ETSI group. It only suggests that the Commission will carefully review the various proposals made to ETSI to ensure their compatibility with EC competition rules. In fact, the same press release was making clear that the Commission had carefully reviewed under Article 81 a prior amendment to the ETSI IPR rules designed to limit the risk of "patent ambush" and that it had cleared it subject to some modification of its content.

integrated essential patent holders, the proposed measures would not promote technical innovation or economic progress, but on the contrary negatively affect these objectives. Second, there is no evidence that end consumers would benefit from what would essentially be a rent-shifting exercise between innovators and implementers. Indeed, it has never been shown that the payment of lower royalty rates to innovators would automatically result in lower selling prices of the products implementing the standard. End user prices depend on a complex number of factors, including the level of competition at the downstream manufacturing level. Third, it is not clear that a system of joint negotiations of royalty rates is necessary (i.e., the least restrictive available method) to achieve the objective (preventing perceived risks of hold-ups and having more certainty as to the costs of implementing a given standard) sought by the proponents of this approach. Finally, joint negotiations would eliminate the competition taking place between standard implementers under the current regime of voluntary disclosure.

IV. Introduction of the principles of “aggregated reasonable terms” and “proportionality” into the definition of FRAND

As has been reported in the specialized press, some members of ETSI (Nokia, Ericsson, and Motorola) have proposed that its current IPR policy be revised in order to introduce the principles of “aggregated reasonable terms” and “proportionality” into the definition of FRAND.²³ Pursuant to this proposal, called “Minimum Change, Optimal Impact”, Aggregated Reasonable Terms would mean that “in the aggregate the terms are objectively commercially reasonable taking into account the generally prevailing business conditions relevant for the standard and applicable product, patents owned by others for the specific technology, and the estimated value of the specific technology in relation to the necessary technologies of the product.” In turn, proportionality would mean that “compensation under FRAND must reflect the patent owner’s proportion of all essential patents.”

If adopted, the proposed approach would create a range of serious issues.

First, any attempt to introduce concepts such as aggregated reasonable terms and proportionality in the definition of FRAND amount to a radical departure of the purpose of that concept, which, as noted above, is to ensure that any standard adopted remains available for implementation by all companies willing to enter into a licence agreement. A FRAND commitment is intended, once given, to prevent a refusal to engage in good faith license negotiations.²⁴ FRAND itself neither imposes price controls on the licensor with regard to the actual level of royalties, nor even a mechanism which would describe the parameters whereby royalties should be established. As already noted above, proponents of this drastic reform offer no empirical evidence that it is needed to prevent what they perceive as significant risks of hold-ups.

Second, modifying the meaning of FRAND in the context of ETSI would create confusion as this concept is also used by dozens of other SSOs. It would in particular create huge difficulties in a number of different contexts, such as 3GPP where member firms can

²³ See “Vendors Seek Compromise on LTE”, Informa Telecoms and Media, 20 March 2006.

²⁴ Such as was the situation in the *Magill/IMS* cases. See Joined Cases C-241/91 P and C-242/91 P, *RTE and ITP v Commission (Magill)* [1995] ECR I-743; and Case C-418/01, *IMS Health v NDC Health* [2004] ECR I-05039.

belong to more than one of the SSOs comprising 3GPP. Unless all these organizations decided to add the concepts of aggregated reasonable returns and proportionality proposed above - a very unlikely possibility as, to the best of the author's knowledge, no proposal for a similar redefinition of FRAND have been made outside ETSI - industry players would thus face several definitions of FRAND with no possibility of knowing to which they should give priority.

Third, one cannot ignore that this approach is made by vertically-integrated firms, which, even if they hold essential patents themselves and thus can claim royalties, have every (self-serving) incentive to reduce the level of royalties they have to pay for the licensing of other firms' essential patents (see below) in order to lower their costs of manufacturing. One should thus not be fooled by this approach, whose objectives have less to do with fairness and reasonableness than with a surreptitious attempt to redistribute rents between pure (i.e., not vertically-integrated) innovators and standard implementers.

Fourth, the proposed implementation of this approach by the firms who developed it would lead to a completely incorrect, unfair, and unsupported way of distributing royalties among essential patent holders. While the proponents of this approach initially stated that proportionality is not simply a numeric equation and that their approach would not amount to imposing a royalty cap, they have in subsequent ETSI documents proposed an interpretation, of proportionality that *entirely relies on a mechanistic counting of essential patents* and which would impose clear limitations on the level of royalties, which can be imposed by holders of essential patents.²⁵

The problem with concepts such as aggregated reasonable terms and proportionality is that, given the complexity of properly valuing IP, there will always be a temptation to resort to simple, though imprecise methods, such as patent counting. Moreover, proposals to rely on patent counting mechanism will often be a strategic approach by firms which hold numerous, though not necessarily valuable patents to obtain more royalties than firms, which hold fewer, though more valuable patents. Because patents have different values, attempts to calculate royalties on the share of essential patents hold by firms are fatally flawed.

In the section which follows, we examine the numerous flaws of any effort trying to impose caps on royalties and then, once a cap has been set, allocate the chosen level of royalties among essential patent holders.

²⁵ According to some ETSI members, under the proposed Aggregated Reasonable Terms a licensee would unilaterally determine that it should pay cumulative royalties of no more than a specified percentage. This determination would be made using unknown information since bilateral negotiations involving a licensor and other parties are generally confidential and not known to the licensee. Then, using the "proportionality" formula, the licensee would gauge each IPR owner's proposed terms to determine whether they are consistent with the licensee's chosen cumulative cap. If any one of the owners of essential patents seeks a royalty that would, combined with other licensors or potential licensors of essential patents, exceed the licensee's self-selected cap, then the prospective licensor, irrespective of the value of its patents or the reasonableness of the licensee's established royalty cap, would be targeted as non-compliant with its FRAND obligations.

V. Capping and allocating royalties among essential patent holders: An exercise in rent-shifting

Firms participating in standardization processes do not share similar incentives when it comes to rewarding the firms, which developed the technologies that have or will allow the adoption of standard in the first place. While pure innovators want to be substantially rewarded for the risks they took in developing the technology, pure implementers want to pay as low royalties as possible in order to maintain downward pressure on manufacturing costs. Firms that both innovate and manufacture may have more complex motivations. As standard implementers clearly outnumber pure innovators, it is hardly surprising that attempts are made to control such rates, for instance through royalties caps.²⁶

The determination of royalty caps needs by definition the determination of a ceiling, which holders of essential patents could not collectively exceed. Although picking a maximum percentage to be allocated between essential patent holders (e.g., 5% or 10% of the sales revenues of the products implementing the standard) could seem simple, it would involve complex dynamics. As illustrated by the example below, not all holders of essential patents place the same importance on the royalties they can obtain from their essential patents.

Let's imagine a scenario where firms A, B, C, D, and E hold essential patents over a given standard. Four of these firms (B, C, D, and E) are vertically-integrated in that they manufacture products implementing this standard and the fifth (A) is not vertically integrated in that it is not involved in any form of manufacturing. While B, C, D, and E may be willing to charge each other very low royalties as they can make their profits downstream, A needs to charge royalties otherwise it would go out of business. This shows that the interests of essential patent holders are not necessarily symmetrical. Note that in the absence of firm A, firms B, C, D, and E could opt for an entirely different strategy by significantly increasing their royalties in order to raise each other's costs. As is widely acknowledged, this strategy is nothing but a form of price-fixing. Instead of collectively increasing the price of their output (with a significant risk of detection), B, C, D, and E decide to increase the prices of the inputs they supply each other. This will in turn increase retail prices, as well as these firms' profits.

The picture gets even more complex if you add to it SSO members, which do not hold essential patents for the standard in question, but need to license such patents to engage in manufacturing the products implementing the standard. These firms have an undoubted interest in paying the lowest possible royalties. When two competing technologies of equal performance can form the basis of a standard, imposing royalty caps is wholly unnecessary as standards implementers have the ability to play one technology against the other with the result that in the absence of marginal costs royalties could end up as low as zero. The situation is, however, different in the presence of a technology for which there is no alternative. In that case, it is argued that absent collective action holders of essential patents will be able to charge significant royalties for their essential patents. As noted above, their ability to charge is nevertheless limited by the presence of horizontal, vertical and institutional constraints, thereby removing any legitimate justification for a royalty cap.

²⁶ See "Groups push for action on intellectual property", *Financial Times*, 21 November 2005 (reporting that a number of mobile carriers made proposals at ETSI to suggest that IPR terms should be agreed before a standard is even set, and argue in favour of putting a cap on the 'maximum royalty payment from individual IPR users to the combined IPR holders'.")

In this latter scenario, vertically-integrated firms and manufacturing-only companies nevertheless now seek to impose a cap on royalties. The sole purpose and effect of such proposals, however, would be to crush pure innovators for which royalties represent the main or unique source of revenue. The imposition of a royalty cap would directly benefit manufacturing-only firms by lowering the costs of an essential input and it would not affect vertically-integrated firms, which, as noted above, can take their profit downstream. Besides the fact it would raise serious competition concerns, this scenario would have two undesirable effects. One is an unjustified transfer of wealth from pure innovators to those engaged in manufacturing activities. The second is that such transfer of wealth would drastically reduce innovation as it would starve innovators from the rewards they need to justify their engagement into costly and risky projects.

But determining the maximum level of royalty is not the only issue that the implementation of royalty caps would trigger. The setting of royalty caps requires the adoption of a methodology to determine how royalties should be apportioned between essential patent holders. Valuing patent portfolios is not an easy matter and a variety of methodologies have been proposed by academics, practitioners, policy-makers, and courts. From a general point of view, there is no doubt that royalty rates that are to be charged for a given patent should be based on the "value" it brings to a standard. Not all patents are of an equal value. Compare for instance the value of an essential patent for jet propulsion as compared to the value of an essential patent for a reclining aircraft passenger seat.

The problem is of course that establishing the true value of a patent requires a complex assessment, thus the temptation to rely on simpler methodologies. One such methodology proposed by royalty caps proponents is to divide royalties based on the proportion of essential patents one firm holds in a standard. Not only is this not supported by any serious economic study, this methodology is prone to serious criticism as it completely ignores the real value of a patent, undermining its importance and contribution to a particular standard. The very notion that royalties could be based on a mere patent counting exercise within a standard would be a demotivator and a disincentive for innovation. Applying this system would result in:

- Serious practical problems - the number of essential patents can change rapidly over relatively short periods of time and hence the proportionate shares of essential patents held by rights holders will also change. This would lead to a significant degree of instability of royalty rates, which would require regular review and would have to be recalculated, presumably on a regular basis, to take into account additional essential patents resulting from the adoption of updates or upgrades to existing standards or the issuance of patents pending;²⁷
- An incentive for bulk declarations of marginal or irrelevant patents and the introduction of needless features into standards simply to generate more patents;
- An incentive for existing holders of essential patents to a standard to resist and derail other companies' proposed updates, upgrades and revisions to previously

²⁷ Such a system would also make it totally impracticable for two companies to reach an agreement since the royalty rates would be ever changing. It would also make it impossible for a patent holder to forecast revenues and profits (and, hence, plan investments), since it would never know the future "value" of its patent holding

adopted standards so as to not reduce the royalties currently received for its essential patents;

- A failure to allocate resources efficiently and reward innovation in an appropriate way, leading to unfair prices. An innovator with a real added value patent (maybe even a breakthrough or “earth shattering” invention) would only be able to receive royalties based on the proportionate share that patent represented with regard to the total number of essential patents in the standard, whatever their commercial or economic value ; and
- Deterring IP holders, especially companies that are not vertically integrated, from participating in SSOs since, by making commitments to such mechanistic formulas within the SSOs, their ability to obtain a fair return on their investment in their essential patents would be severely restricted whilst vertically integrated SSO members continue to secure financial returns on their investments through profits on their product sales unrestricted by any such price controls.

Moreover, such a proposed system would be both unfair and unreasonable. Companies with large patent portfolios would capture the greatest royalty earnings notwithstanding the actual value of their patents, even if those patents did not require nearly the same level of investment as the one made by other firms. Meanwhile, companies with perhaps a smaller number of more valuable patents would receive a smaller return. This would result in prices being unfair and unrelated to the true value of the patent. In the end, this rule would encourage an absurd proliferation of patents being contributed to a standard and declared as essential regardless of their innovative or commercial value. Each company participating in standard setting would have a strong incentive to maximize the number of patents that it files and contributes, rather than the quality of the innovation. In addition, patent holders would have a powerful incentive to separate each invention into as many distinct patents as possible (rather than merely adding to the number of claims for one patent), to artificially create a larger number of patents; hardly an activity worth encouraging and rewarding. Under this scheme, the larger a company’s essential patent portfolio, regardless of the quality or value of the patents contained, the larger its share of the royalties for the standard.

This shows that simplistic methods such as patent counting cannot be the basis for allocating royalties among holders of essential patents. Other, more sophisticated mechanisms exist that might better reflect the real contribution of a patent or a set of patents to a standard, and also factor in other forms of consideration (cross-licensing, etc.), which will usually be taken into consideration in licensing negotiations. These mechanisms, however, involve difficult to apply assessments for valuing essential patents, and would no doubt be extremely hard, not to say impossible, to implement in a context where multiple firms hold essential patents and where numerous firms are seeking licenses for such patents. They would thus be inappropriate for use in the standards context. This shows the key advantage of FRAND, which is that it is broad and flexible, and able to adapt to the specific factual circumstances surrounding the myriad of considerations that make up the market.

VI. Conclusions

For a century, SSOs have conducted valuable standardization activities, which by rendering product compatible and inter-operable around the best technologies have substantially contributed to the diffusion of innovation and the enhancing of competition between products and services. The system applied in many SSOs, whereby firms holding patents they deem essential to a proposed standard make voluntary commitments to grant licenses on FRAND terms to implementers before a standard is finally adopted, has allowed licensors and licensees to adopt mutually satisfactory agreements.

In recent years, however, several firms and commentators made a variety of proposals allegedly designed to prevent essential patent owners to engage in hold-ups, as well as to maintain the level of royalties charged by such owners to “reasonable” levels. These proposals have, for instance, requested that: firms that hold patents they deem essential disclose their licensing terms before the standard in question is adopted; essential patent holders and standard implementers be entitled to jointly negotiate licensing terms before the standard is adopted; and even the imposition of maximum level of royalties or royalty caps. Vertically-integrated mobile equipment vendors have also suggested that ETSI’s IPR Policy be amended to include the notions of “maximum reasonable terms” and “proportionality” in FRAND.

This paper argues that these attempts misunderstand and exaggerate the risk of patent hold-ups and the imposition of “unreasonable” rates by essential patent holders and, in particular, pure innovators. Should they be adopted, they would: rigidify or simply eliminate the bilateral licensing negotiations between essential patent holders and implementers; eliminate the competitive aspect of the standardization process whereby firms make different strategic choices as to the desirability to license patents before or after the adoption of the standard; create enormous implementation difficulties and delay standardization processes with resulting significant welfare losses; generate serious competition law issues; and, in most cases, lead to fundamentally flawed and unfair mechanisms of allocating royalties among essential patent holders.